The Tool Engineer

Vol. V. No. 5.
September
1936

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★ 5700 ★
CIRCULATION
This Issue

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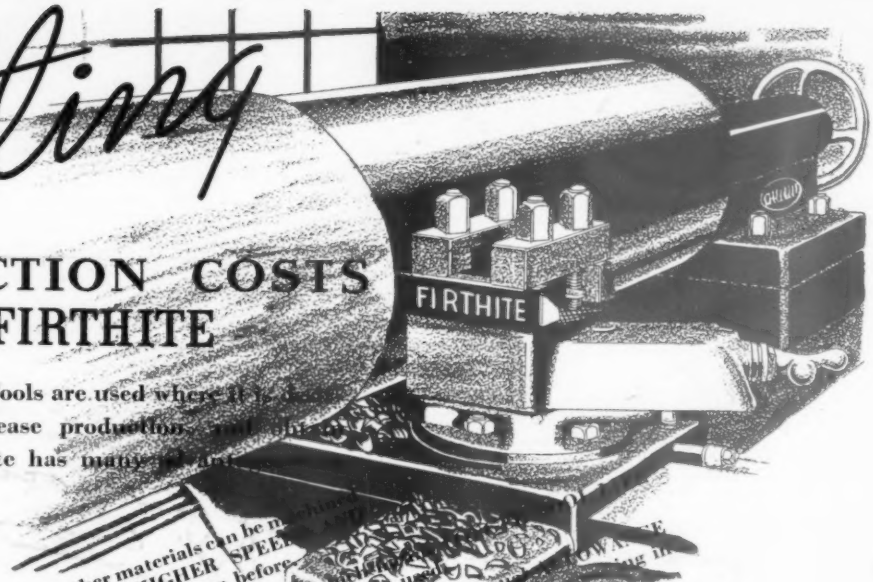
Official Publication of the
AMERICAN SOCIETY OF TOOL ENGINEERS

Cutting PRODUCTION COSTS *with* FIRTHITE



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2. Firthite is highly resistant to wea... even though increased speeds and feeds are used...
3. Scale on castings has little effect on Firthite—the ... FOR MACHINING CAN BE SUBSTANTIALLY REDUCED, ... a saving in material.
4. The keen, sharp cutting edges of Firthite tools, used at speeds higher than those of other cutting materials, PRODUCE SMOOTHER FINISHED PRODUCTS.
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6. Firthite permits the machining of thin frail parts because CUTTING PRESSURES ARE REDUCED at higher speeds.
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8. Tools operated at slow speeds often break away the edges of the work. Firthite eliminates this difficulty because of higher cutting speeds and REDUCES MANUFACTURING LOSSES.
9. The generation of heat to the surface of the work is reduced to a minimum through faster cutting with Firthite tools, resulting in LESS WARPAGE.
10. Hard materials that usually cause machining difficulties can now be cut with Firthite because of its unusual hardness and its ability to hold up under adverse conditions that break down other cutting tools. This feature has resulted in the DEVELOPMENT OF NEW MATERIALS WHICH HERETOFORE WERE IMPRACTICAL.

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(above)
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(at left)
Machining the rough casting.

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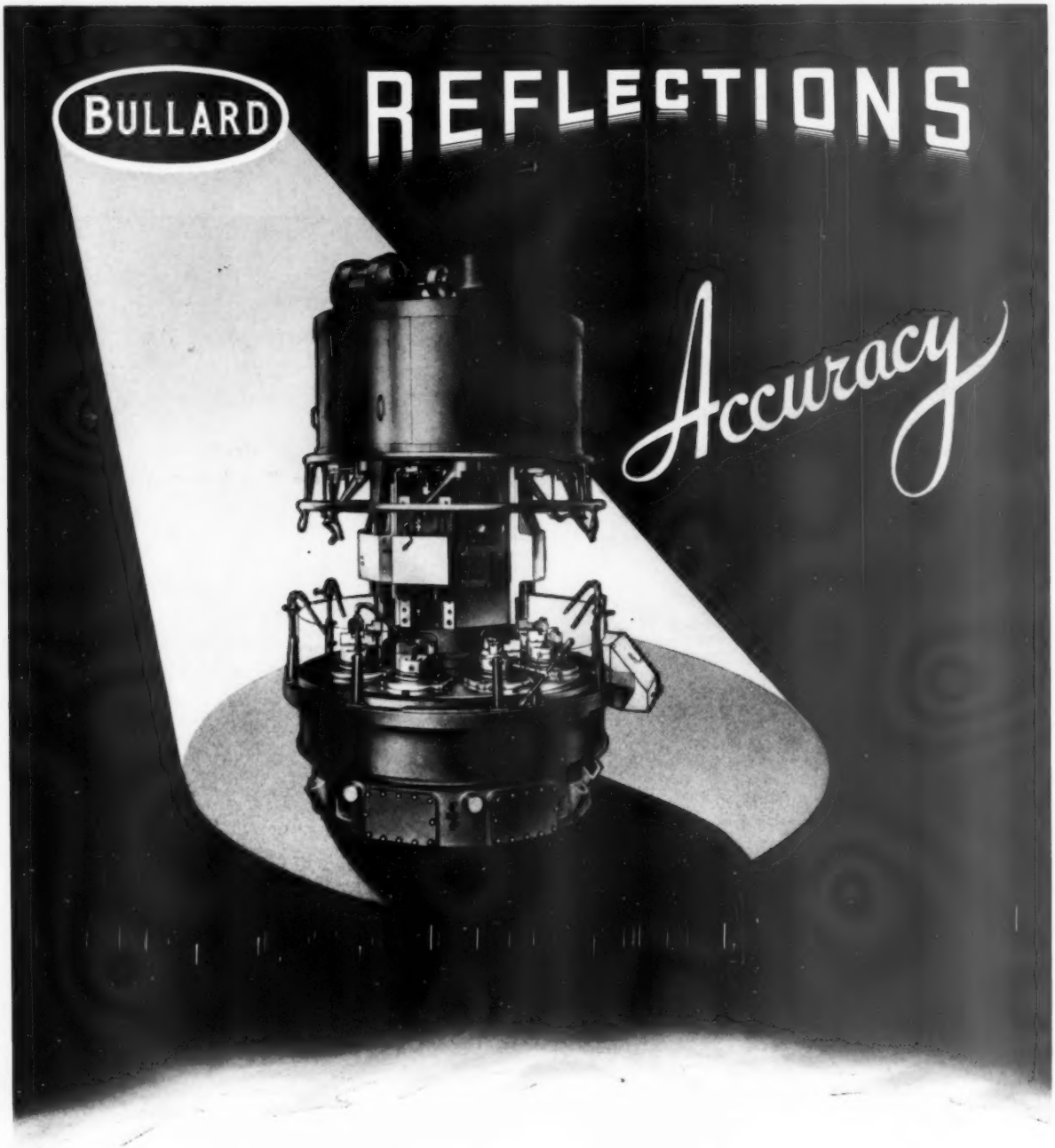

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Official Publication of the AMERICAN SOCIETY OF TOOL ENGINEERS

Vol. V. SEPTEMBER, 1936 No. 5

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Owing to the nature of the American Society of Tool Engineers organization, it cannot, nor can the publishers be responsible for statements appearing in this publication either as papers presented at its meetings or the discussion of such papers printed herein.

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SEMI-ANNUAL MEETING IN DETROIT

OCTOBER 8th

Of special interest to Tool Engineers is the coming semi-annual meeting of the American Society of Tool Engineers, to be held in Detroit on October 8th, 1936.

Detroit Chapter will be host to their fellow A.S.T.Eers at this meeting, which will attract Tool Engineers from all over the country. We look forward eagerly to becoming better acquainted; to effect a closer cooperation and to formulate plans for the growth of the A.S.T.E.

So, you Tool Engineers North, East, South, West, set this date aside and make this your slogan: "All Roads lead to Detroit October 8th." There will be big doings, and you don't want to miss out.

LOOK FOR DETAILS IN THE OCTOBER ISSUE OF *The Tool Engineer*.

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Above—Small and large size shell reamers, and a tapered shank fluted reamer. At left—Barber-Colman inserted blade reamer.

Below—One of four Barber-Colman Reamer Sharpening Machines in the tool rooms of a leading automobile manufacturer.

Barber-Colman Reamer Sharpeners

In our plant, the Barber-Colman Automatic Reamer Sharpening Machine creates the distinctive tooth form, accurate size and keen edge characteristic of Barber-Colman Reamers. In your plant, this machine reproduces the same tooth form and keen cutting edge, restores the original accuracy of inserted blade reamers. Easy to set-up, having automatic features which make it simple to operate, this machine creates savings for plants using any considerable quantity of reamers. Investigate. Write for Bulletin F1427.

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ENGINEERED PRODUCTION
EXAMPLES FROM THE SUNDSTRAND FILES
No. 3620
Lathes
Milling Machines
Tool Grinders
Centering Machines
Balancing Tools

Model 10 Automatic Stub Lathe Licks A Tough Job Two Ways

Accurately turning the crankshaft shown in Figure 1 is a tough job because the steel is tough and the shaft would spring under pressure of the cutting tools if held in the conventional way. Sundstrand engineers licked the job by doing it on the Model 10 Automatic, shown in Figure 2, which has a Sundstrand patented driver that grips the work-piece close to the crank-throw thus reducing overhang to a minimum.

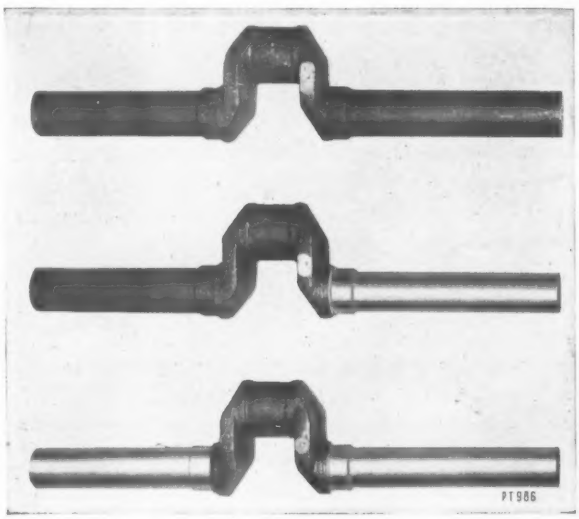

Fig. 1.—Three crankshaft forgings; top, rough; middle, one end machined; bottom, both ends machined.

Machine is equipped with standard front tool slide having automatic feed-in and tool relief, and a standard cross-feeding rear tool slide. Automatic control of tool carriages gives rapid approach, feed, quick return and stop; all synchronized with automatic start and stop of the spindle. Production is high, accuracy limits maintained consistently.

The Model 10 Automatic Stub Lathe is popular for its simple design, easy set-up, power, rigidity, accuracy and stamina. Speeds, feeds and carriage movements all can be adjusted quickly to meet the requirements of the wide variety of work-pieces within the capacity of the machine. This; combined with the automatic cycle and high-speed shockless rapid traverse; provides economical, high production on short runs as well as long ones.

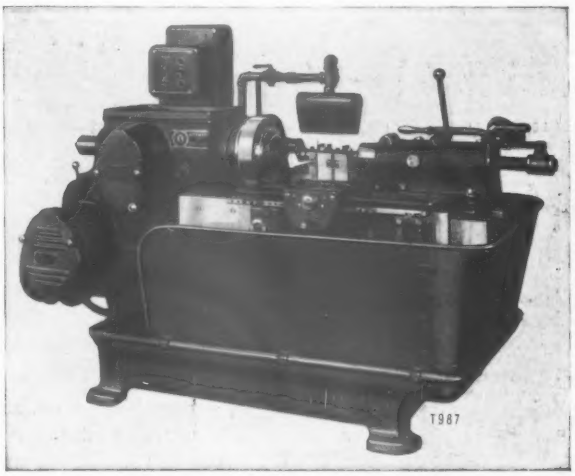

Fig. 2.—Model 10 Automatic Stub Lathe equipped for machining crankshafts shown at left.

For accurate, high-production turning at minimum cost, investigate Sundstrand Stub Lathes and Sundstrand Engineered Production Service. Send drawings and data for reliable estimates.

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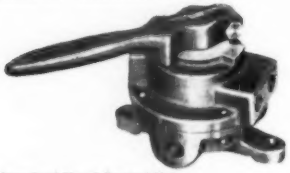
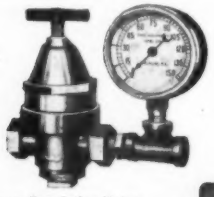


Standard Hand Control Valve



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★ Hannifin "Leakproof" Air Cylinder design has been still further improved — with an even simpler outside adjustment. The adjusting nut and tube are now an integral assembly held in a fixed position on the threaded end of the piston rod. There can be no end play of the adjusting tube as the packing wears. Correct adjustment of the soft, graphite-treated piston packing can be made whenever required, simply by loosening the lock nut and turning the adjusting tube.

Friction is greatly reduced, thus assuring maximum power. The simple means of adjustment allows of maintaining maximum efficiency of the piston seal throughout the entire life of the packing.

Hannifin double acting air cylinders for pressures up to 150 lbs./sq. in. are available in a full range of standard types and mountings, in sizes from 1 inch to 16 inch diameter and for any length stroke. Larger bores made to order. Single acting and double acting types; also with air cushion at either or both ends if needed.

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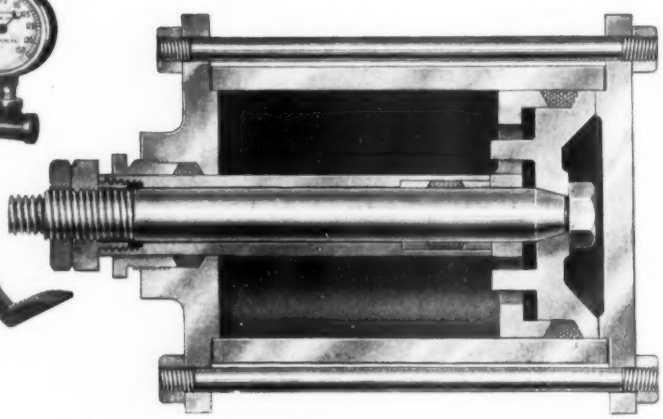
Bulletin No. 34 describes and lists the entire line of Hannifin Air Cylinders and Air Control Valves. Write for your copy.



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PNEUMATIC AND HYDRAULIC PRODUCTION TOOL EQUIPMENT

What is Wrong With TOOL DESIGN?

By

Andrew E. Rylander

Mr. Rylander's articles, from time to time, have brought comments and letters from readers of *The Tool Engineer* from all sections of the country. In this discussion, he hopes to bring out more interesting viewpoints and comments from his readers, on a subject he is qualified to speak on, having had more than thirty years experience as a tool designer and manufacturing executive.—Editor.

THE question itself presupposes something wrong, and is a challenge to thought rather than a blanket criticism. But frankly, tool design has not kept pace with the progress of engineering in general; certainly not with machine design. By tool design, we mean specifically the design of special jigs, fixtures and similar accessory devices, exclusive of the general run of small tools which have been highly developed in the past few years. The design of the former requires a degree of quick analysis, an equally quick inventive ability and a generally broad knowledge of requirements, while small tools are often the result of experiment and research. They are slowly developed, in other words, although the final design (if there is such a thing) may not differ superficially from the original concept.

Let us here clarify a point. While assuming something wrong with tool design we do not imply that tools, as designed today, do not work. We mean that they could be better; that present trends in design are not up to standard. We are guilty of stagnation, if not downright retrogression, and the fault is not altogether with the designers of tools. Chief draftsmen, master mechanics and even the customers, when tools are designed on contract, are to blame for conditions; in fact, we are inclined to believe that the fault is shared by the schoolmaster.

Advent of Mass Manufacturing

For purposes of comparison, it will be necessary to go back a few years—to the few years preceding the world war. At that time mass production was just coming to the fore, with interchangeability a word to conjure with. The "Mike" was law and the measuring machine the ultimate, snap and plug gages were in common use and the "Jo Block" was just looming over the horizon. Yet, at that time tool design was a jump ahead of machine design. At least, this condition prevailed in the east, and, judging from talks by prominent speakers on the early problems of the automotive industry, the east led the middle west by a wide margin.

United Shoe Machine is credited with being the pioneer in interchangeability; certainly they were years ahead of the sensational dismantling, scrambling together and reassembling of the Cadillac car at the Boston Auto Show in 1914 or thereabout. Yet, in 1903—06, the Goodson Electric Ignition Co., of Providence, was producing magnetoes on an interchangeable basis. The jigs and fixtures used were simple in operation yet ingeniously designed, and in some respects superior to many now considered modern.

Previous to 1910 Mergenthaler was producing interchangeable parts for linotypes; by 1911 International Typesetting Mach. Co. was manufacturing parts on interchangeable system, not mass production as we know it today but volume production to a high degree of accuracy. Those tools were entirely modern. Within the past three years we have heard talks on new methods of tooling and processing which were old 25 years ago. Over 20 years ago Langeliers, of Providence, designed and manufactured on contract numerous jigs and fixtures which proved themselves under the most severe conditions, yet, the same designs advanced recently have been considered untried and therefore not acceptable. "Don't invent anything—do it the way they did it last year," is a not an uncommon objection to a design which the chief draftsman has not seen before. That is one of the troubles with tool design—we are doing too much of what was done last year, yet, paradoxically, too little of what was done a decade or more ago. We have gotten away from common sense fundamentals; we consider a design tricky if it *looks* complicated, quite forgetting that looks may belie performance.

To cite specific instances, we have seen roll feeds, for presses and other machines, designed and produced by the scores; in jewelry manufacture they work at almost unbelievable speed day in, day out without any trouble. *They have to.* The same principles would apply under any conditions, but all too often the right principles are not applied. The tooling of turret lathes is a comparatively simple matter, yet we state as a matter of opinion that comparatively few tool designers are capable of turret tooling. Even such a simple thing as a boring bar, and the proper angles of setting cutters to prevent chatter is a mystery to many of our modern Knights of the Pencil.

Consider the Operator

For years, we furnished hand knobs and leaf screws altogether inadequate for the operator, and woe betide the designer who put a big knob on a

(Continued on page 23.)

PRODUCTION PERSPECTIVES

News of Mass Manufacturing From Everywhere

● ● ●

From practically all reports, from all sections of the country, **nothing but an optimistic view of industrial conditions can be taken at this time.** Plant expansions, acquisitions of plants and facilities by the larger companies, two and three shifts working in production departments, promotions of Tool Engineers, here and there, and **payrolls,** generally, **considerably higher** than a year ago—all indicate a healthy "back to normal" for Tool Engineers and production executives. The former mid-summer slump does not appear to have effected employment figures, materially, in metal cutting industries. **New England** is **holding its high level** of production in the manufacture of a wide diversity of products from machine tools, business machines, hardware goods etc. to radios and household apliances. **Detroit area**, however, at this time, is **exhibiting a lull in production** as tooling programs are now largely completed and **production lines are slowing down in readiness for 1937 models.** Some plants had contemplated production on new models by September 1st, others by September 15th, but apparently **few if any of the major automobile factories will begin 1937 production sooner than October 1st**. One reason given for this delay is the tardiness of new equipment deliveries.

Maintenance of a high production level in Connecticut manufacturing centers through the mid-summer period is indicated by employment reports from Hartford, Bridgeport, Waterbury and Meriden. In Hartford County, **employment** in 82 plants as of August 1 was **99.6 per cent of the "normal"** figure, based on employment January 1, 1929, and **12.3 per cent ahead** of August 1, 1935. Bridgeport's weekly average payroll in July was $874,240, 13.05 per cent ahead of last year and but 2.22 per cent below the June, 1936 figure, as revealed by a Bridgeport Chamber of Commerce survey furnished to *The Tool Engineer*. Waterbury establishments had a total of 32,586 workers as of July 30, an increase of 3,968 over last year and 625 over June. The bulk of Waterbury's gains were centered in eight large factories. Payrolls for June in 25 Meriden factories totalled $124,574, a gain of 7.4 per cent over June, 1935 . . . . . **Louis H. Knopf,** 63, superintendent of the **Singer Mfg. Co.,** Bridgeport, since 1910, and connected with the company since boyhood, died July 24 after an illness of several months. He had served his apprenticeship in the Singer toolroom. . . . . **Homer D. Bronson,** 88, founder of the Homer D. Bronson Co., **Beacon Falls,** manufacturer of piano hardware, brass and bronze goods and hinges, died suddenly of a shock August 10. . . . . **William H. Byrne,** for many years superintendent of maintenance for the New Haven Clock Co., New Haven, died August 12. . . . . **David McWhir,** 53, **chief inspector** for the **Pratt & Whitney Aircraft Co.,** East Hartford, died August 6. He was with Wright Aeronautical Corp. before joining P. & W. four years ago. . . . . **American Brass Co, Ansonia,** is **starting construction of** two one-story **additions** at its Upper Mills, at a total cost of $100,000. . . . . **Bridgeport Brass Co.,** Bridgeport, has **purchased** a **large** piece of **property adjacent to its Housatonic avenue factory** and plans to use it for erection of a **new rolling mill** comparable in size to the company's present rolling mill. Construction work will start early next year. The newly-acquired property has river wharf facilities. The company **reports net profit** for the six months ended June 30 of **$384,354** after depreciation, federal income taxes and other charges. . . . . **Schick Dry Shaver, Inc., Stamford,** is **erecting** a **new factory** building on Garden and At-Atlantic Streets at a cost of about $65,000. . . . **Chapman Machine Co., Terryville,** automatic screw machines and screws, has disclosed **plans** for a **new** brick **building** adjoining its present plant. . . . . **Norwalk Lock Co., South Norwalk,** builders' and marine hardware, has **let contracts** for construction of **a factory addition,** three stories high, 28 x 56 feet, of brick and frame. . . . . **Farrel-Birmingham, Inc., Ansonia,** is **starting construction** of a trestle, 500 feet long, and a **new storage building,** 200 x 60 feet. The company builds rubber and rolling mill machinery. . . . . **Manning-Bowman** Co., Meriden, electrical household appliances, has **started production on a new line of streamlined flat irons** for home use which features a long-life heating unit, heat control dial, thermostat, and chromium finish. . . . . Seamless Rubber Co., Inc., New Haven, is preparing to introduce a new stopperless combined water bottle and ice cap with a patented closure.

Reversing the usual mid-summer downward trend, the **clock manufacturing plants in Connecticut** are **maintaining unusual activity. Waterbury Clock Co.** has **jumped its schedule** from four and four and one-half days **to five and one-half days. Lux Clock Co.,** also in Waterbury, is **planning to add several hundred employes** as soon as plant additions are completed. **William L. Gilbert Clock Co., Winsted,** and **E. Ingraham Co., Bristol,** are **operating on full time** and the **New Haven Clock Co.,** recently paid a divident of $1.62 ½ a share on its 6½ per cent preferred stock. . . . . **Traveling Cabin Trailer Corp., Bridgeport,** has started production in the former Le Baron plant on Hollister avenue, owned by Briggs Mfg. Co. of Detroit. **William J. Seelinger** of **Detroit** is president; **W. W. Link** of **Bridgeport,** treasurer, and **George Cooper, Akron,** Ohio, secretary. . . . . **Landers, Frary & Clark, New Britain,** has **excellent business** prospects **in England,** according to **Charles F. Smith,** chairman of the board, and **Richard L. White**, treasurer, who have just returned from Europe. . . . . **Business is booming in England, they said.** . . . . . **Monowatt Electric Corp,** crowded out of its quarters in the General Electric Co. plant at Bridgeport because of G-E expansion, is taking over a group of vacant buildings on Hatheway

street, Providence, R. I., where operations will be centered in the future. . . . . **Welker Mfg. Co.,** Middletown, fiber washers, has **purchased** the **former American Hammer Co.,** factory in nearby Cromwell and is moving into its new quarters this month. . . . . **New Britain Machine Co.,** New Britain, automatic screw machines, sheet metal stamping and metal office furniture, which has acquired the entire capital stock of the **New Britain-Gridley Machine Co.,** has decided to terminate the corporate existence of the latter concern and its **business will henceforth be operated as a division of the acquiring** corporation, producing chucking and screw machines.

* * * * *

The **Springfield, Massachusetts** area **continues to be busy**—most plants there operating at full capacity, although there is a falling off in one or two lines. This is, however, considered a seasonal let-down with prospects for the fall season looking "good."

Orders by the **Holyoke Machine Company,** Holyoke, for large calenders and other machinery for paper mills **have fallen off lately,** but **renewal and repair operations,** which are taken care of principally by the Worcester branch, are reported as **running in good volume**. Good orders for new equipment placed early in the year have kept the Holyoke plant running at a good level and the slackening of orders is regarded as largely seasonal in character.

Charles Koegel's Sons Company, manufacturer of slitting and cutting equipment for paper machines, in Holyoke, reports that orders have fallen off this month following an excellent run of business through June and July consisting of orders for new equipment. If fall business measures up to standards set in the early part of the year, the year as a whole should show a marked improvement over recent years.

Frank Lyman Cone, 67, president of the **Cone Automatic Machine Company,** Windsor, Vermont, died August 14 at his home. The company is the town's principal industry and was founded by Cone, who is credited with having invented and constructed the largest automatic lathes in the world. He leaves his widow, a son, and two daughters.

The tool industry will have a big part at the 20th Annual Eastern States Exposition at West Springfield, September 20 to 26. The following have already reserved space: American Saw & Manufacturing Co., Springfield; Chapman Valve Co., Indian Orchard; Henry Disston Co., Philadelphia; J. E. Hall Co., Hartford; Hampden Grinding Wheel Co., Springfield; H. K. Porter, Inc., Everett; Rototiller Inc., Long Island City, N. Y.; Stanley Rule & Level Co., New Britain, Conn.; Van Norman Machine Tool Co., Springfield; Walker Turner Co., Plainfield, N. J.; Weidemiller Grinding Co., Inc., Springfield.

Athol manufacturers are spending more than $175,000 to repair damage wrought by the March flood and to safeguard against further damage.

At the **Union Twist Drill Co.,** along the river bank a sloping retaining wall of rock and cement is being constructed to protect the factory property. At the end of this factory near the Chestnut Avenue bridge, the foundation was undermined by the flood waters and this damage has been repaired.

Batter boards are placed about three feet higher on the stone retaining wall on the river edge at **the L. S. Starrett Co.,** four story brick factory and the finished wall will protect the property in the future high water seasons. Several tiers of sand bags were used at this point during the March flood.

The Perkins Machine & Gear Company's all-day outing under the auspices of the Permag A.A., the athletic association operated by the employes took place August 15, at Turner Park in Longmeadow. Starting at 10 o'clock the activities got under way and from that time on, until the opening of the bake, a varied program of events was enjoyed.

* * * * *

Resignation of **Delmar G. Roos,** vice-president of the **Studebaker corporation,** South Bend, Indiana, in charge of engineering, recently was confirmed by corporation officials. Mr. Roos was chief engineer of the Pierce-Arrow Motor Car company from 1921 to 1922 and of the Marmon Motor Car Company from 1925 to 1926. He is a former president of the Society of Automotive Engineers. . . . .

A new testing and trouble-shooting unit, which will enable any service man to make a complete, point-to-point anlaysis of automobile or household radio sets, **is to be manufactured in South Bend by the Radio Products** corporation, **a new subsidiary of the Bendix** Aviation corporation. The announcement, made by **Vincent Bendix,** president of the aviation corporation, said that the rapidly growing radio market for automobiles offers "an unusually large market for the Bendix-Dayrad testing unit."

John M. Floyd, works manager of the Bendix Products corporation for the last five years, **has resigned.** On September 1 he was to **assume his new duties as vice-president in charge of manufacturing and engineering of the A. O. Smith Company, Milwaukee, Wis.,** manufacturers of automobile frames. His successor has not been announced.

C. H. Waters Machinery Company at **Elkhart,** has purchased the **Swivel Joint and Shaft Company factory** at Plymouth, Indiana, together with six acres of ground. The property recently was sold at auction by the Samuel Winternitz Company at Chicago, who had acquired it through a receiver's sale. Mr. Waters said that he may open a machine shop later. The purchase price was said to be $1,600.

* * * * *

Few companies in **Milwaukee**—and for that matter anywhere else in the country—can produce a better record of progress than can the **Automatic Products Co.,** Milwaukee. Started by **Roy Johnson** in 1931, just as the depression really got going, with three employes, the firm is **keeping 200 busy today;** original floor space has jumped from 2,000 square feet to 24,000 and further expansion is expected. **This year's business is 300 per cent above 1935.** The company manufactures control equipment for refrigerators, oil burners, air conditioning systems, etc.

An engineering office and **laboratory building** for the tractor division will be put up by the **Allis-Chalmers** Mfg. Co. **in West Allis.** To cost about $75,000, it will be located north of the main offices. The structure will be three stories high, the first

(Continued on page 14.)

Who Will Go The Farthest In Tool Engineering?

Reader Comments

We print below, without change, a letter from one of our readers in the belief that it will make interesting reading.

436 So. Franklin St.
Janesville, Wisc.

The Tool Engineer,
2842 W. Grand Boulevard,
Detroit, Michigan

I have carefully read what both anonymous author's have to say regarding this subject, and I believe that before a suitable answer can be given we must give a definition of "The College Graduate," and "The practically trained man." Following are my remarks on this subject.

The college graduate is one who has attended daily a certain institution of learning for a given length of time, devoting a major portion of his time to a given subject, and as Will Roger's once remarked "Receives a diploma not because of what he knows, but because of what he remembers."

The practically trained man is one who serves his time doing the actual work and while doing this learns from books those things which are an aid to him in the daily grind.

The average practically trained tool engineer has reached his position along lines very similar to the ones I am laying down herewith.

After graduating from high school he enters some large manufacturing plant as a tool maker apprentice. After a year or two he reaches the conclusion that tool making is very interesting, but the income of the average tool maker does not compare very favorably with the income of his former school mates after they complete their college training. Therefore he gets down to brass tacks with the thought in mind that he can be a better man then the boss is and get a position like his, and by doing this he will have an income as large as his former school mates that have had the college training, as well as prove to them that one does not need a college education to be a success.

He soon realizes that whatever he gets he has to work hard for, consequently he apreciates it more and makes certain that he does not lose any of the knowledge which he gets. Furthermore as time goes by he realizes more and more his lack of a college education and he knows that his only chance lies in his ability to produce results. This brings on the thot. "Why can't I get books from the library or enroll in some correspondence school and learn the theory of Tool Engineering. He decides on the library and spends many hours each week reading subjects pertaining to tool making and engineering. As time goes on he puts into actual practice many of the theories which he has read, and oftentimes adds some of his own experience to make the theory more workable. Furthermore, many times during these years he has been in the center of many problems of tool engineering, some of which have been fostered by college graduates, others by practical trained men, and in most cases the solution has been arrived at through the aid of both the college graduate and the practical trained man.

(Continued on page 23.)

HANDY ANDY'S WORKSHOP

Well, we've had a vacation of a sort during the hot weather (if working overtime on advanced production schedules can be called a "vacation") and may now look forward to renewed activities during the fall and winter seasons. It promises to be a big year, with many big doings. We Detroiters, for instance, are all agog about the big Semi-Annual Meeting October 8th, when we hope to meet many friends from other chapters.

* * * * *

Our Editorial chairman, Andy Rylander, is especially anxious to meet the several Secretaries, Editorial and Publicity Committeemen—*or* their *delegates.* Be sure to look him up.

* * * * *

You know, if I had my own way about writing, I would sooner write about people than any other topic. People are so infinitely more worth while, and so interesting. I would like, among other things, to build up friendly relations, to present to my readers the fine qualities of my friends, especially among Tool Engineers.

* * * * *

Tool Engineers are an interesting lot, in common with all engineers and creative workers. It just happens that they are put to more grief than the rest. Programs break with a bang, then it's hustle and bustle to meet production schedules. But as a group they are fine and splendid—human!—and so utterly straight-forward in their convictions and dealings with their fellow men. They work hard and, in reaction, play hard. . . But, they are responsible and dependable in the main . . . . . Good citizens.

* * * * *

If I were to start a personal Hall of Fame, I think I would give Prexy Ford Lamb the honor niche. For hard work, for conscientious attention to detail, for tact and diplomacy, he stands in a class by himself. To these qualities may be added a fine personality and a progressive spirit. During his tenure of office, the A.S.T.E. should grow to large proportions. No charge, Ford—the pleasure's all ours.

* * * * *

Considering other possibilities, I am hard put to choose from so many deserving of mention. But O.B. Jones comes readily to mind. He's really the Daddy of A.S.T.E, in case you don't know it—and how his family has grown. Solomon in all his wisdom and vigor couldn't have done better.

* * * * *

Another ASTEer of note is Homer Bayliss, of Motch & Merryweather. A gentleman of the old school, Homer; a hard worker for the A.S.T.E. whose specialty is getting the cream of speakers for our meetings. Incidentally, Mr. Bayliss is a fine host, and distinguishes a table. Hail, Homer!

* * * * *

Pretty soon the A.S.T.E. Speaker's Club will be under way again. Now there's an institution! You can't imagine the topics discussed during those sessions of our future Demosthenes? (Well, *orators,* then!) I have heard, indirectly, that Ed. Harper's treatment of a subject is a revelation. Better get in on a good thing, men.

(Continued on page 28.)

One Hundred Years of TOOL ENGINEERING

THERE is nothing in industrial history more spectacular or more romantic in its development—or more essentially American than the history of Tool Engineering. The history of this branch of classified knowledge may be said to extend back one hundred years to the canny skill and perspicacity of several Yankee mechanics. It was they who first applied the principles of interchangeable manufacture, the "assembly line" and mass production. It was Samuel Colt's revolver, patented in 1836, that changed the course of this nation—a harbinger of untold ramifications in manufacturing progress, mass comforts and mass enlightenment. You Tool Engineers, who read these lines, take justifiable pride in the realization that yours is a profession which is and has rendered immeasurable service to mankind.

The scientific mind is accustomed to reasoning from cause to effect. In going back over the past one hundred years since Eli Whitney, inventor of the cottin gin, first applied interchangeability to the manufacture of component parts, it is difficult to determine which was the cause and which the effect—Tool Engineering or mass production. Certain it is, however, that volume production of a multitude of products in the more modern times caused the profession now known as Tool Engineering. Tool Engineering, however, has *effected* present day mass production.

The history of Tool Engineering is a history of interchangeable manufacture. Interchangeable manufacture, in itself, is a simple concept, but the direct and indirect benefits to the public as a result of interchangeable manufacture are nothing short of phenomenal when viewed in their true aspect.

Typical of the outstanding Yankee mechanics of his time, Samuel Colt with his invention of a multiple firing arm, in a sense pointed the way toward mass production. The volume production of a reliable, practically infallible, small arm was unmistakably a major factor in the conquest of the West. The product, oddly enough, was one in which precision manufacture was imperative, for the user of it depended upon its reliable performance, at times, for his very life. Thus we see here a direct benefit in the production of a useful precision product with the indirect benefit, characteristically the most far reaching, materially aiding the civilization and settlement of the untamed West.

The modern motor car, typical product of mass manufacturing, has the utilitarian or direct benefit of providing *mass* transportation — to all strata of American citizenry from the lowest to the highest income brackets. But, the indirect benefits of the automobile are legion—from the hard surfaced roads that lead to almost every town and hamlet bringing the more remote backwoods folk into more continual and closer contact with the outside world, to the changes in the styling of women's clothes. Imagine a five to six foot hoop skirt or a three and one half foot picture hat finding favor in the modern tonneau.

An interesting contrast is provided through the mass manufacture of so common a commodity as *buttons*. Picture grandmother or great grandmother sewing, by hand, a piece of cloth over a wooden form to make a button. And—today, millions of mass manufactured buttons being used on all manneer of garments or the newer "Zipper" fasteners, an outstanding result of precision mass manufacture which is adding to the convenience and comfort of the people.

Yes, the modern scene presents many objects and many "effects" which are caused by mass production. Tool Engineering has a very real kinship with the modern mode in providing the more abundant life in most material things. The average citizen encounters the effect of the Tool Engineer's skill in almost everything he does. He may sleep in a mass manufactured metal bed. He may be awakened by the "whispering" or the "shouting" of a mass manufactured alarm clock, shave before a mirror of a stamped metal medicine cabinet, eat a breakfast of mass produced or processed "breakfast food" drive to work in his car and use modern office appliances, business machines, telephones—or mass manufactured machines and tools of a thousand and one different kinds to speed and facilitate his daily activities. At home his wife finds the mass manufactured washing machine, vacuum cleaner, mangle, refrigerator, sewing machine and other modern appliances a great boon in her activities. Before long all will know the comfort, winter as well as summer, of mass manufactured air conditioning.

These benefits of mass production are but suggestive of the wide influence of the early pioneers of precision interchangeable manufacture. The whole proposition is definitely *American*, both in original concept as well as in its development and consummation. It is a part of the more recently

Only 100 Years Ago

There was not a public library in the United States.

Almost all furniture was imported from England.

An old copper mine in Connecticut was used as a prison.

There was only one hat factory and it made cocked hats.

Every gentleman wore a queue and powdered his hair.

Crockery plates were objected to because they dulled the knives.

Virginia contained a fifth of the whole population of the country.

A man who jeered at the preacher or criticized a sermon was fined.

Two stagecoaches bore all the travel between New York and Boston.

A day laborer considered himself well paid with two shillings a day.

The whipping post and pillory were still standing in Boston and New York.

Buttons were scarce and expensive, and the trousers were fastened with pegs or lace.

Leather breeches, a checked shirt, a red flannel jacket and a cocked hat formed the dress of the real artisan.

Beef, port, salt fish, potatoes and hominy were the staple diet all the year around.

—Quoted in *National Glass Budget*

much maligned "American System." Yet, strangely, it has brought to this nation more progress, more enlightenment, more wealth, more happinesss—despite the inherent economic advantages to the industrialists who find the utilization of "machine skill" and the subdivision of labor more profitable. In this system we see the Tool Engineer coming more and more into his own. In major auto plants we find the Tool Engineering department, now, passing on product design—*from the important manufacturing standpoint*. The professional training, skill and experience of the Tool Engineer has always been recognized by management. Without the manufacturing experience of the Tool Engineer being used to modify product design economical production is impossible.

Letter from Readers

MEYER-HELLER
Engineering
Detroit, Mich.

July 9, 1936.

The Tool Engineer,
2842 W. Grand Blvd.,
Detroit, Mich.

Gentlemen:

In reply to the editorial in the *The Tool Engineer*, Vol. V., No. 3, July, 1936, "Packard shows the way."

We wish to support said editorial as well as highly commend the Packard policy. We are fully aware that this is but an initial step toward social security of all workers who in turn must follow, endorse and support Packard's initiative. This must be much the more appreciated when Packard's earnings are compared with those of its powerful competitors.

We also congratulate *The Tool Engineer* for its unbiased report, and we wish it the best of success in its effort to further the mutual understanding between industry and its loyal workers.

Yours sincerely,

MEYER-HELLER ENGINEERING,
per C. Meyer,
W. Heller.

PRODUCTION PERSPECTIVES

(Continued from page 11.)

floor 60 by 200 feet and the second and third 60 by 100 feet.

* * * * *

The U. S. Navy awarded a **contract** August 7 **to** the **Winton Engine Corp.** of Cleveland **for $988,163** to build two sets of propelling machinery for Navy submarines. The machinery will be equipped with Elliott electrical devices.

Buckeye Bumpers, Inc., Springfield, Ohio division of the Electric Auto-Lite Company of Toledo, **will double its 1936** output of bumpers and will start production of hub caps and spring covers. **A daily output of 5,000 bumpers is scheduled for 1937** and production on the new orders will start August 15.

The **Timken Roller Bearing Co.,** Canton, Ohio has received an order from the **Canadian National Railways** for bearings to equip four existing class U-1-A passenger locomotives. Application will be made in Canadian National shops at Montreal.

Ground was broken August 17 for erection of a $50,000 addition to the plant of the **Miller-Shelby Products Co.,** at Shelby, Ohio a subsidiary of the Michigan Steel Products Co. of Detroit.

* * * * *

The travelodge," an auto trailer, will be made in three sizes for the tourist trade by the **Pierce-Arrow Motor Car Co.**

Expansion of the **Joy Manufacturing Company,** Franklin, Pa., by purchase of the Venango Manufacturing Company plant was announced August 12.

The plant, to be reconditioned, will be operating in 30 days with 50 additional men. **W. E. Barrow, president,** announced. The company has been specializing in automatic coal loaders.

* * * * *

While production operations in **automobile** plants of the Detroit area as well as in assembly plants throughout the country are slackening, **considerable building and extension plans** are going ahead. It is estimated that a total of **$100,000,000** is being or will be spent **in the near future** for **new plants, new equipment** and **modernization.** This all appears to point to a **demand for automobiles** in the period to come **surpassing anything yet known in the history of this industry.** Chrysler in Detroit is now installing heavy machinery at its McGraw Avenue DeSoto plant, **Oldsmobile** in Lansing expects **to spend more than $6,000,000** to increase production facilities.

Frank D. Longyear has been **promoted to Production Supervisor for Reo Motor Cor Company at Lansing.** He has been with this company more than twenty years and lately has served in the capacity of a department superintendent.

All roads lead to Detroit, October 8th, the Semi-Annual Meeting of A.S.T.E. See next issue for full details.

NEW EQUIPMENT

Michigan Tool Company, Detroit, announces a new cutting alloy to be known as **"Crobalt"** which is being placed on the market nationally both in bulk and in the form of cutting tools. The new alloy is a non-ferrous, high speed cutting material whose major ingredients: tungsten, cobalt and chromium are combined with certain other constituents that are said to be responsible for the alloy's high cutting efficiency and long life. A feature of this metal, it is claimed, is that the productivity per grind is apparently not affected within a wide range by cutting speed or tool temperature. This makes possible a marked stepping up of production per hour without sacrificing tool life.

This cutting metal will be available in the form of both standard and special cutting tools and also in bulk to the other manufacturers. In addition to turning, forming, facing tools, etc., a complete line of straddle and face-milling cutter blades and assemblies is offered.

The Sundstrand Machine Tool Company, Rockford, Illinois has recently developed a **"Rigidmil" having an automatic hydraulic cycle which includes actuation of the spindle-head and clamping both ends of the cross rail as well as hydraulic feed and rapid traverse of 72" in both directions of the table.** The operating cycle of the machine is entirely automatic after starting, and is accurately controlled by easily adjusted dogs—a feature which makes the machine readily applicable to a wide variety of work. The spindle head rapidly approaches the work, feeds to depth against an easily-adjusted positive stop, and clamps hydraulically. The table feeds to a predetermined distance; then the head unlocks, rises, table advances to position for next cut and cycle is repeated. Then the table rapidly traverses to starting position and stops. The manufacturer states that the Sundstrand Hydraulic circuit is equally effective in both directions and entirely suitable for "climb cut" milling. It is said that this new machine provides one of the most complete examples of the successful application of hydraulic pressure to machine tool actuation that has yet been developed.

B. C. Ames Company, Waltham, Mass. Ames **new dial gauges,** No. 56 and No. 57, show the exclusive features of shock-absorbing wheel assembly, removable case stem and spindle, no screw point, wire-attached bezel, finger-fit crystal, solid steel back, short spindle with coarse rack, cup dial and straight line hand, and no spring under dial. The new gauge is said to withstand general rought treatment and retain its original setting and is an entirely new product of the B. C. Ames Company. Further details will be gladly supplied upon request.

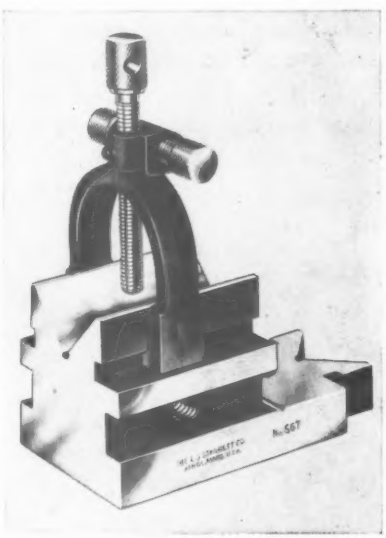
A new milling machine vise with an easily removable swivel indexing base, announced by **Athol Machine and Foundry Company of Athol, Mass.,** provides for a wide range of general machine shop uses. Used with the indexing base, milling machine and other operations requiring accurate angle settings are easily and conveniently handled. Removed from the swivel base, the vise is ideally adapted to drill press and many other types of use.

The indexing base is graduated over 180 degrees, extending 90 degrees each way from zero. Two clamp bolts hold the vise bed in position on the swivel base. The vise base, bed, and jaws are semi-steel castings of generous proportions. Jaw facings are hardened tool steel and are removable. Inexpensive false jaws may be provided, shaped to hold any shaped piece. The vise screw has the Athol buttress thread. An extra heavy shoulder is an integral part of the vise screw. The crank handle is long enough for ample leverage, and is removable.

The swivel base milling machine vise is available in two sizes, with 4" jaw and with 6" jaw.

Federal Products Corporation, Providence, R. I., announces a **new type of Dial Indicator.** These new Federal products are full jeweled, Low-Friction Dial Indicators. It is claimed that exceptional accuracy has been obtained by reducing internal resistance to a minimum. It is also said they follow the work directly because they are extremely smooth and free in action. Because of their light but positive action, it is said, they exert a more uniform and constant pressure—an important consideration in obtaining accurate inspection. Out of roundness and other irregularities are more quickly detected and there is less "needle flicker" because the indicator point does not "bounce."

Starret V Block and Clamp. The L. S. Starrett Company of Athol, Mass., has added to their line a new V Block and clamp with features, it is claimed, that broaden its use for both production and inspection work.



A forged clamp, which holds cylindrical stock in the V grooves, has an adjustable support to keep the

(Continued on page 24.)

PATENTS

PATENT APPLICATIONS

Sixth in a series presenting a concise, informative guide on the subject of patents.

By EVERETT G. WRIGHT
Patent Attorney
Detroit, Michigan
Member of the Michigan and Federal Patent Bars

Applications for Letters Patent. An inventor is required by statute to make an application for Letters Patent for his invention in writing to the Commissioner of Patents. It is important to note that only the actual inventor is entitled to apply for a patent for his invention, and, if it can later be proved that the person signing the application for patent was not in fact the real inventor, the patent will be declared invalid.

The formalities of patent applications and regulations for the examining and prosecution of the same are set forth in the Rules of Practice in the United States Patent Office.

A complete application for patent comprises a filing fee of $30.00 and $1.00 for each claim in excess of 20, a petition, a specification including claims, and an oath; and drawings when the nature of the invention admits of illustration.

When a completed application received by the Patent Office it is given a filing date and serial number, it is then classified according to its subject matter and sent to the proper division for examination. The applicant is informed of the filing date and serial number given his application and of the division to which it was sent for examination.

The prosecution of the application to its allowance or final rejection including interference procedure will be explained later.

Petition. The petition must be addressed to the Commissioner of Patents, and must state the name, residence and post office address of the petitioner requesting the grant of a patent, designate by title the invention sought to be patented, contain a reference to the specification for a full disclosure of such invention, and must be signed by the inventor, or, if the inventor is deceased, by his executor or administrator, or, in case the inventor became insane, by his legally appointed guardian, conservator or representative.

Specification Including Claims and Drawings. The general requirements for the specification including claims, and for drawings are fully set forth in *Rules 34, 35, 36, 37, 38, 39, 49 and 50* of the Rules of Practice and are quoted below.

Rule 34. The specification is a written description of the invention or discovery and of the manner and process of making, constructing, compounding, and using the same, and is required to be in such full, clear, concise, and exact terms as to enable any person skilled in the art or science to which the invention or discovery appertains, or with which it is most nearly connected, to make, construct, compound and use the same.

Rule 35. The specification must set forth the precise invention for which a patent is solicited, and explain the principle thereof, and the best mode in which the applicant has contemplated applying that principle, in such manner as to distinguish it from other inventions.

Rule 36. In case of a mere improvement, the specification must particularly point out the parts to which the improvement relates, and must by explicit language distinguish between what is old and what is claimed as new; and the description and the drawings, as well as the claims, should be confined to the specific improvement and such parts as necessarily cooperate with it.

Rule 37. The specification must conclude with a specific and distinct claim or claims of the part, improvement, or combination which the applicant regards as his invention or discovery.

Rule 38. When there are drawings the description shall refer to the different views by figures and to the different parts by letters or numerals (preferably the latter).

Rule 39. The following order of arrangement should be observed in framing the specification:

(a) Preamble stating the name, citizenship, and residence of the applicant and the title of the invention.
(b) General statement of the object and nature of the invention.
(c) Brief description of the several views of the drawing (if the invention admits of such illustration).
(d) Detailed description.
(e) Claim or claims.
(f) Signature of the applicant.

Rule 49. The applicant for a patent is required by law to furnish a drawing of his invention whenever the nature of the case admits of it.

Rule 50. The drawing may be signed by the inventor, or, (if the inventor is deceased, by his executor or administrator, or, in case the inventor is become insane, by his legally appointed guardian, conservator or representative), or the name of the applicant may be signed on the drawing by his attorney in fact. The drawing must show every feature of the invention covered by the claims, and the figures should be consecutively numbered, if possible. When the invention consists of an improvement on an old machine the drawing must exhibit, in one or more views, the invention itself, disconnected from the old structure, and also in another view, so much only of the old structure as will suffice to show the connection of the invention therewith.

Oath. The making of an oath is a statutory requirement and a condition precedent to the grant of a valid patent. The following Rule of Practice contains the requirements for the oath.

Rule 46. The applicant, if the inventor, must make oath or affirmation that he does verily believe himself to be the original and first inventor or discoverer of the art, machine, manufacture, composition, or improvement, or of the variety

(Continued on page 28.)

A Conveyor Level BORING MACHINE

for Precision Finishing OF CYLINDER BORES and OTHER LARGE WORK

The Heald No. 45 Cylinder Boring Machine is built specifically for precision cylinder boring and for other large work. The steadily increasing number of installations in the automotive industries indicate the appreciation of these manufacturers for the remarkable accuracy and fine finish produced by this machine.

The Heald Style No. 45 Bore-Matic is of the horizontal type with the table at conveyor level and is built around an extremely massive and rigid base. As many as eight cylinders can be bored simultaneously. A hydraulic retraction device for the heads eliminates drag lines when the tools are withdrawn. The machine weighs 11,000 lbs. without fixtures and will handle holes up to approximately 9" diameter by 16" long.

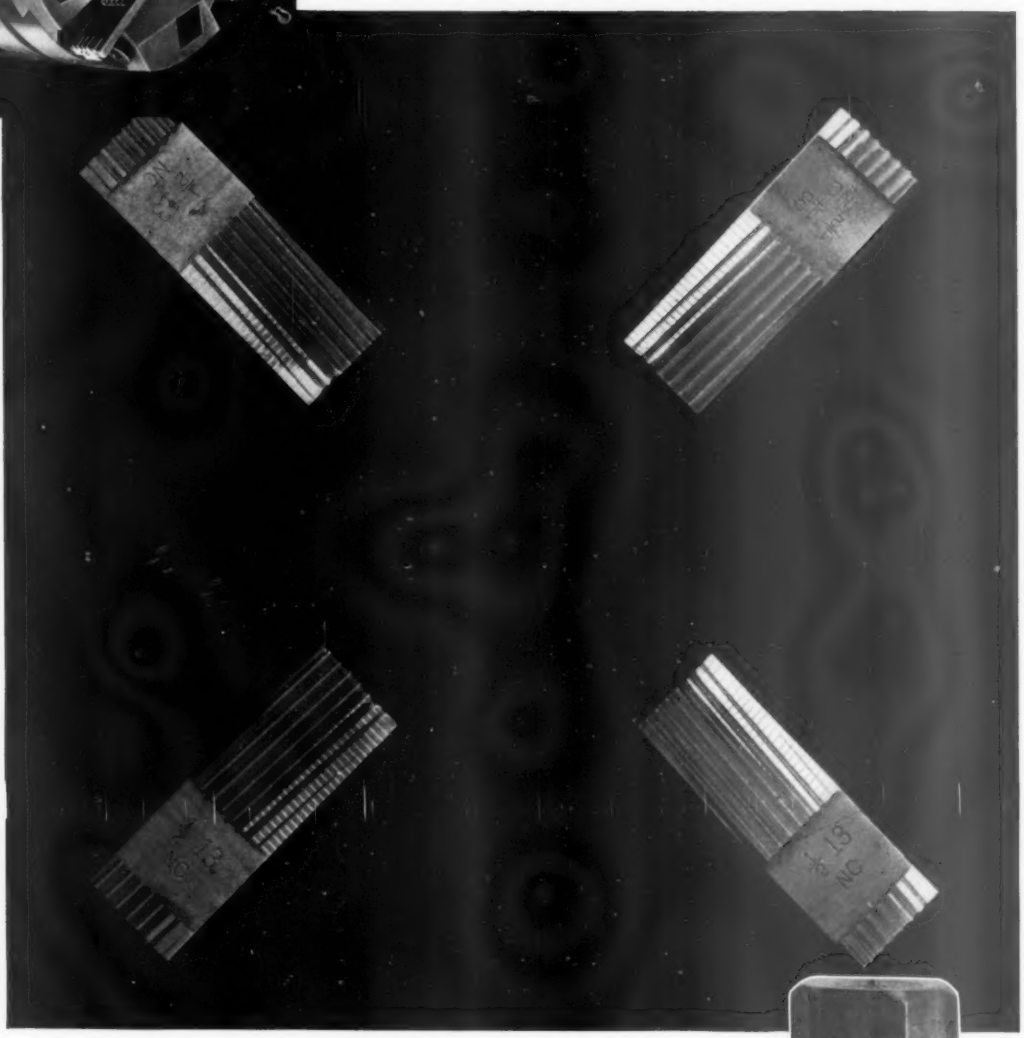
If you are interested in extreme accuracy, high finish, plus increased production, ask for complete information on the No. 45 Bore-Matic.

While the above No. 45 Bore-Matic is borizing a 4-cylinder block, it will handle 2-cylinder blocks equally as well. Machines have been installed for not only twos and fours but also sixes, straight eights and V eights as well as a variety of large awkward work with single or multiple bores.

THE Heald MACHINE CO. WORCESTER, MASS

46,790 Cap Screws

NO. 21 J & L TANGENT DIE



UNRE-TOUCHED PHOTO OF THE CHASERS

"ANOTHER EXAMPLE OF J&L THREAD TOOL SUPREMACY"

UNRETOUCHED PHOTO OF THE 46,790th CAP SCREW (CLASS-3 FIT)

Threaded without grinding Chasers

AND STILL WITHIN CLASS 3 TOLERANCE

The unretouched photographs on the opposite page give further proof of J&L's Thread Tool supremacy. The No. 21 J&L Tangent Die with this set of ½"-13 Chasers was used by one of our customers on a 1¼" four-spindle automatic screw machine. Without sharpening the Chasers, 46,790 hexagon cap screws 1½ inches long, ½"-13 thread, were each threaded over a length of 1¼ inches, and, although showing signs of wear, the Chasers were still producing threads within Class-3 tolerance. That's real performance!

We have saved production time, worry, and expense for so many manufacturers, very likely we can be of assistance to you. Your inquiries will be given our prompt and thorough attention.

The J&L line of Tangent and Radial, Stationary and Revolving Dies covers a wide range of sizes. Bulletins giving further details will be sent on request.

JONES & LAMSON MACHINE COMPANY
SPRINGFIELD, VERMONT, U. S. A.
[THREAD TOOL DIVISION]

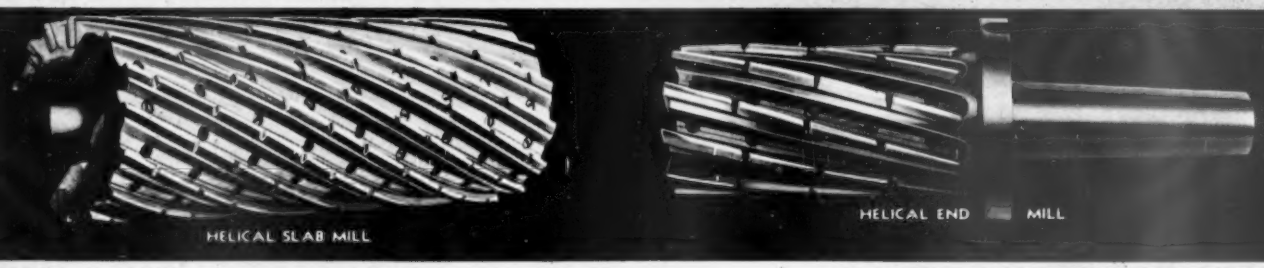
INGERSOLL *Inserted Blade*

CUTTERS FOR ALL PURPOSES

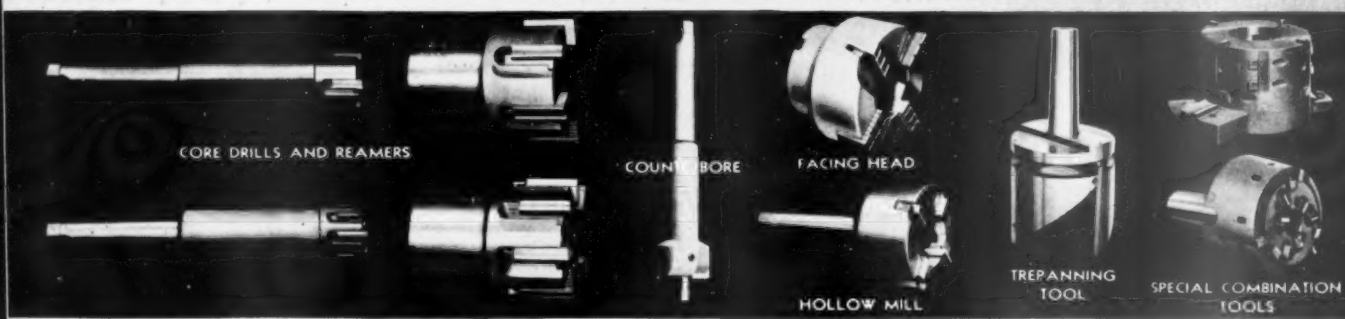
INGERSOLL ZEE LOCK FACE AND END MILLS

INGERSOLL *Ray-Blade* FACE MILLS FOR HIGH PRODUCTION

INGERSOLL ZEE LOCK SIDE MILLING CUTTERS



INGERSOLL INSERTED BLADE HELICAL MILLING CUTTERS

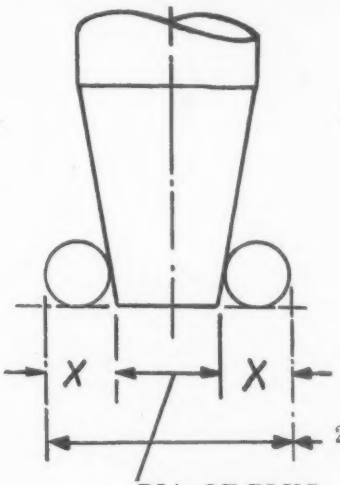


INGERSOLL MULTI-BLADE CUTTERS

Let Ingersoll be your Tool Engineers—WRITE FOR COMPREHENSIVE INGERSOLL CUTTER CATALOG

THE INGERSOLL MILLING MACHINE CO., ROCKFORD, ILLINOIS

TAPER DATA

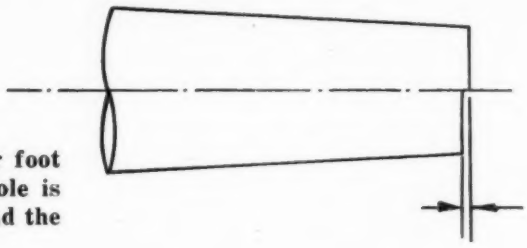


Taper Per Foot	Angle With Center Line	X. Dim. For Various Size Plugs .125	.250	.375	.500	
.125	0 17 54	.12532	.25064	.37596	.50129	
.250	0 35 49	.12565	.25131	.37696	.50261	
.375	0 53 42	.12598	.25196	.37794	.50392	
.500	1 11 36	.12632	.25264	.37897	.50529	
.5161	1 13 53	.12635	.25272	.37908	.50544	#10 B & S
.600	1 25 55	.12657	.25315	.37973	.50631	All Jarno
.602	1 26 12	.12662	.25330	.37984	.50646	2 & 3 M. T.
.623	1 29 12	.12665	.25323	.37996	.50661	4 M. T.
.625	1 29 31	.12665	.25331	.37996	.50662	7 M. T.
.626	1 29 39	.12666	.25331	.37996	.50662	6 M. T.
.630	1 30 14	.12669	.25338	.38007	.50676	5 M. T.
.750	1 47 24	.12699	.25398	.38097	.50597	
.875	2 05 16	.12733	.25466	.38198	.50931	
1.000	2 23 8	.12767	.25534	.38301	.51069	
1.125	2 41 1	.12801	.25603	.38405	.51206	
1.250	2 58 52	.12836	.25672	.38508	.51344	
1.375	3 16 44	.12870	.25740	.38611	.51481	
1.500	3 34 35	.12905	.25811	.38716	.51622	

Courtesy of Edward C. Lee, Chief Designer, Chrysler Jefferson Plant. Member A.S.T.E.

TEAR OUT AND FILE FOR FUTURE REFERENCE

TAPER DATA



EXAMPLE
If the Taper is .600 per foot and the limit on the hole is .004 multiply .040 x 4 and the drop is .160.

Drop in .001 per .001 limit on taper hole.

TAPER PER FOOT	TAPER	DROP
.125		.20222
.250		.09821
.375		.06486
.500		.04801
.5161	#10 — B & S	.04652
.600	All Jarno	.040
.602	No. 2 & 3 Morse	.03987
.623	No. 4 Morse	.03853
.625	No. 7 Morse	.03839
.626	No. 6 Morse	.03833
.630	No. 5 Morse	.03809
.750		.03199
.875		.0272
1.000		.024
1.125		.0213
1.250		.019
1.375		.0174
1.500		.016

TEAR OUT AND FILE FOR FUTURE REFERENCE

Courtesy of Edward C. Lee, Chief Designer, Chrysler Jefferson Plant. Member A.S.T.E.

WHAT IS WRONG WITH TOOL DESIGN?

(Continued from page 9.)

small screw. Better let the operator use a wrench—only the chief designer didn't know that. Even today we impose more grief on the machine operator than the occasion warrants, simply because too little thought is given to convenience of handling. A tool should be designed so that the operator using it has pep enough at the end of the day to stage a party or make love to his wife. (And, with modern household appliances, she should be in a receptive mood.)

Now, we are fully aware of the *progress* made in tooling; we have merely presented one side of a controversial topic, leaving ample loopholes for readers to attack the argument. We can say, for instance, that some very excellent standard fixtures have been developed, but, these have been *developed!* And, — that numerous standard jig, fixture and die accessories are now on the market which were not prevalent a few years ago. These have also been developed; all that is necessary is to apply them correctly. *That*, in many instances, entails design.

Well, gentlemen, there lies the bone of contention. We have stated a proposition and will consider it right—(on the side tentatively taken) until proven wrong. In a succeeding article we shall advance a few more "wrongs" about tool design. We can stick to the "rights" as proven foundations for future prograss, nevertheless, we should not impede progress by continuing mistakes nor, inversely, by failing to avail ourselves of the common sense, *tried* methods. We are just starting this game of Tool Engineering, so, let's start it right.

A concluding installment, in an early issue, will discuss correct and incorrect design.

WHO WILL GO THE FARTHEST IN TOOL ENGINEERING?

(Continued from page 12.)

I believe the practical trained man will go further in tool engineering because of the following reasons:

First: — He has combined his book learning with his practical training in such a way the fundamentals are forever clear in his mind.

Second:—He has acquired the habit of devoting a certain portion of his time to reading articles pertaining to his profession.

Third:—For years he has been looking forward to the day when he will be better then the other fellow, so he can hold a position like his.

Last but not least he has learned through experience that he must be able to do his work better then the next one if he is to get and hold the better positions, for in a large percent of the cases a college graduate is given the preference over the practical man.

In closing may I add that this is not written maliciously, but purely to present the practically trained man's side of the question.

Yours truly,

LOUIS KRIESER

(An employee of Fairbanks Morse & Co., at Beloit, Wis.)

(Continued on page 25.)

4680 combinations of Danly Standard Die Sets can be shipped from Danly Branch Office-Plants in 24 hours from each of these points—4680 combinations of size, thickness and material of shoe and punch holder, bushings and length of pin.

Each of these Danly Branch Office-Plants offers manufacturers in its area *faster deliveries* of *better die sets* at *lower final costs.*

Any die-set requirement in industrial U.S.A. is met immediately by the Danly Distribution Plan.

Next time die sets are the most urgent need in your plant, call the Danly Branch nearest you. Over night, they settle the matter.

The Danly Man in your territory will explain the Danly Distribution Plan.

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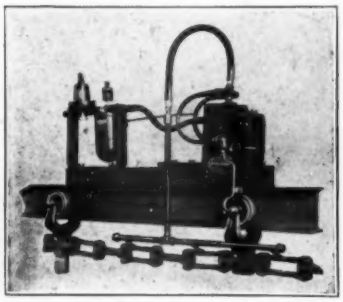
DANLY DIE MAKERS' SUPPLIES

NEW EQUIPMENT

(Continued from page 15.)

block from tilting while it rests on its side. One end of the block is stepped down. It has a V-groove and slots at right angles to the base in which the clamp can hold shoulder studs, round pins, etc., for light milling, drilling and grinding. Hole clearance is provided for drilling and removing dowel pins and four 3/8" x 16 tapped holes, two in the base and one on each side, permit securing the block to a face plate or angle iron.

The block is commercially accurate and makes an excellent support, it is said, for duplicate cylindrical parts being inspected with a dial indicator. It is approximately 1 7/8 inches square, with a base length of about 3 5/8 inches and a capacity of 1 5/16 inches.



J. N. Fauver Company, 912 Selden Avenue, Detroit, announces a **device that automatically applies to every conveyor trolley wheel bearing, every time it passes a given point, lubrication in the form of an oil fog,** and in the same manner lubricates every pin in the chain links. The self-contained assembly is mounted on the conveyor rail at any convenient poit. Air pressure from the plant air line is regulated by a Norgren ventilating valve and then passes through a Norgren air line lubricant where oil is fed drop by drop to the air stream to form a fine mist. Direction and volume of the lubricant is easily adjustable. Advantages claimed for this system include unfailing lubrication of each bearing and each chain link every time they pass the lubricator, a saving in lubricant, the practical elimination of labor for applying lubricant, elimination of work spoilage due to dripping of excess lubricant and a saving in power through effective lubrication of the whole conveyor system.

The Fellows Gear Shaper Company, Springfield, Vermont, has recently developed a **new machine and a new type of tool for finishing spur and helical, internal and external gears.** The principle emlpoyed on this machine differs from the Gear Shaper method in several respects: The tools used are made without any outside angle or side clearance to the teeth, and instead of being geared in harmony with the work, drive the latter. The enveloping generating tool is kept in intimate contact with the work at the same time that it is being rotated at high speed accompanied by a comparatively slow reciprocating movement.

The enveloping generating tool employed in this process embodies teeth that are conjugate to the teeth on the work, but so related that the teeth on the tool and work mesh only when the axes are placed askew to one another. The cutting edges on the tool intersect the faces of the teeth and extend in planes that are transverse to the axis. Thus, when the tool and work are brought into intimate contact and rotated under pressure, the divergent paths through which the teeth travel causes the cutting edges to move lengthwise and remove material by a shearing action. The surface of the teeth back of the cutting edges also contact the work under pressure, and effect a burnishing action, which produces a smooth surface on the contacting surfaces of the gear teeth.

This burnishing action is effected by making the sides of the teeth on the tool bowed, so that contact between tool and work takes place over substantially the entire length of the engaging surfaces. For an external gear, the teeth on the tool are bowed inward; whereas, for an internal gear, the teeth on the tool are bowed outward, because an internal gear is the reverse of an external gear. The cutting faces of the two members of the tool are slightly separated from each other. The width of this space and the degree of curvature, or amount of enveloping contact of the teeth, are important, as they govern the amount of material removed at each traverse cycle of the tool, as well as the resultant finish on the work.

The outstanding virtues of this process for finishing gears, it is claimed, are: simplicity of design; ease of sharpening; and high production. The tool is simple in design, as it comprises only four members, two cutting and burnishing members, a spacing collar, and a holder upon which the members are retained.

The Exact Weight Scale Company, Columbus, Ohio, announces the **"Shadowgraph"—a new principle in precision weighing**. This new weighing mechine will be of interest to the tool engineer or inspection department of industrial plants for the purpose of parts selection. It is claimed that the Shadowgraph may be moved from one operation to another without levelling procedure and it is completely self-contained, unaffected by severe dust condition, flying materials, and grime and dirt in general. Further details may be had upon request from the manufacturer.

This Month's Cover

GEAR MEASURING MACHINE

The photograph on this month's cover shows an ingenious device for the measuring of gears. The operator is shown checking the involute profile. The helix angle, the lead, spacing and concentricity of gear teeth on either spur or helical gears as well as the lead of helical spline shafts and helical guides are also checked on this machine.

An early issue of *The Tool Engineer* will devote much of its space to gear cutting, finishing and grinding as well as problems connected with accurate, economical and effective mass manufacturing of gears of all types. Look for it, soon.

Syracuse Company Stocks Snap Gauges in Detroit

John A. Kopf, Michigan Representative for the Meldrum-Gabrielson Corporation of Syracuse, New York, announces a complete stock of "Syracuse" Snap Gauges now on hand for immediate delivery from Detroit stock to the automotive and other trade in the Michigan area.

The Detroit office is located at the Lexington Building 2970 West Grand Boulevard. Telephone MAdison 5721.

WHO WILL GO THE FARTHEST IN TOOL ENGINEERING?

(Continued from page 23.)

In line with the same topic, we print excerpts from a letter of Assc. Prof. Carl W. Horack, of the College of Engineering, University of California. This member is an old timer in Tool Engineering and a live booster for A.S.T.E. So, from all quarters come expressions of interest concerning our topics.

UNIVERSITY OF CALIF.
College of Engineering
Berkeley
Dept. of Mechanical Engineering
Room 234, Mechanic Bldg.
July 26, 1936.

American Society of
Tool Engineers,
Detroit, Mich.
Dear Mr. Bramson:

I am finally getting around to answering your friendly letler of June 11. You are probably not aware of the fact that the spring semester at the University of California ends during the middle of May and that many of the faculty are either away on a vacation trip or are engaged in other work during the summer.

During the last three summers I have been offered work for the summer. This summer I am doing layout work in the Tool-design department of the Caterpillar Tractor Co. in San Leandro, 15 miles distant from here. The previous two summers I checked die-designs for the Marchant Calculating Machine Co.

I would like to have spent this summer in Detroit, but work seemed quite plentiful here this summer, at least I had four positions offered me before college was actually over. So I have been very busy up to the present time. Last week about 1,000 machinists and tool-makers went on strike in this district, East Bay area. This has stoped production in the plants affected. If a settlement is not reached within the next week or two, the engineering departments may also stop working until the rest of the plant resumes operations. So you see we have such troubles too.

I was very much interested in the articles discussing the question whether the college man or the shop man made the best Tool-engineer. Since my work during the past twenty years has been about equally divided between Tool-engineering work and the teaching of Machine Shop Practise, Heat-treating and Drawing to engineering students, this question has been of interest to me for quite a few years.

I had intended to send in a reply to the first article, but other business came up at the time which would have prevented me from getting it in on time. If this subject has not already received too much space in the Journal I would still like to send in my views on the question.

Since, I am not able to participate in the monthly meetings of the society, I always look forward to the arrival of the monthly Journal. I am hoping that I shall be

(Continued on page 32.)

Colonial has pioneered in the development of special grinding machinery giving greater broach accuracy in routine production. Back of every Colonial tooled job is Colonial's experience of 20 years as industry's leading designers and producers of broaches.

There is a Colonial Broach Representative in your Territory.

COLONIAL BROACH COMPANY
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In addition to every type of broach, standard or special, Colonial also offers a complete line of POPULARLY PRICED standard broaching machines and broach sharpeners—12 basic types—over 50 standard models.

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San Francisco, Calif.—H. E. Stallman
Syracuse, N. Y.—Roy W. Glahn
Toledo, Ohio—W. F. Haverstock
J. W. Mull, Jr.
Tulsa, Okla.—Brammer Machine & Tool Service

SEPTEMBER CHAPTER MEETINGS

Chapter Meeting Announcements must be received on or before the 20th of preceding month. Any omissions are the result of not receiving this information by this date—in time for publication.

CLEVELAND

September 15th, 1936

Dinner: 6:00 P.M.

$1.00 per plate

Technical Session at 7:30 P.M.

NELA PARK, GENERAL ELECTRIC COMPANY, NOBLE ROAD ENTRANCE

Dinner and Technical Session will be held in the Dining Room in the Sales Promotion Building

Speaker: MR. E. L. SHANER, Editor of Steel

Vice President, PENTON PUBLISHING COMPANY
Cleveland, Ohio

Subject: "What's Ahead in Engineering Development"

Make reservations immediately with Mr. G. J. Hawkey, Secretary. Cleveland Duplex Machine Company, Penton Building. Telephone Main 0112.

This is Open House Night at the Institute Building and the ladies are cordially invited. There will be a lecture on lighting and home appliances, etc. Also displays. CARS PARKED FREE

DETROIT

September 10th, 1936

Dinner: 6:30 P.M..

Technical Session: 8:00 P.M.

HOTEL FORT SHELBY—SPANISH GRILL ROOM

Speaker: MR. CHARLES J. MARTIN, Production Engineer, Ex-Cell-O Aircraft & Tool Corporation, Detroit

Subject: "Fundamentals of Tool and Fixture Design"

Mr. Martin was for many years, Assistant Chief Draftsman of the Tool and Machine Division of the Ford Motor Company. There are few men in the City of Detroit who have had more experience than Mr. Martin, in trying out a wide variety of fixture design. He is unmistakably well qualified to speak authoritatively on the points that are often overlooked in tool and fixture design, which frequently cause much difficulty on production lines. This is a technical discussion that should be of intense interest to the practical production executive and warrants the largest attendance we have yet had, as the subject is one of primary importance to the membership.

MILWAUKEE

September 10th, 1936

REPUBLICAN HOUSE

"Around the Blackboard Discussion"—8:00 P.M.

An open discussion of shop problems. Everyone invited to join in the discussions.

Speaker: DR. HARRY K. IHRIG, Globe Steel Tubes Co., Milwaukee, 8:30 P.M.

Subject: "Ihrigizing"

Dr. Ihrig is the inventor and developer of the process known as "Ihrigizing." This process was developed in the laboratories of the Globe Steel Tubes Company in Milwaukee. It renders ferrous metals resistant to corrosion, heat and wear. The popular general nature of this subject should arouse great interest and a large attendance is anticipated.

IMPORTANT NOTICE: A buffet luncheon will be served at the close of the technical meeting. Tickets are 75c each, obtainable upon admission to the meeting. Members are urged to attend this meeting and to bring their friends.

Readers of *The Tool Engineer* and friends of the American Society of Tool Engineers, whether members or not, are invited to any of the above meetings.

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No matter whether your requirements are for light work or for heavy duty cutting, there is an O. K. Inserted-Blade Cutter for the job. These efficient cutters are made as small as 4" in diameter and are available for slotting, milling, facing, boring .... for any type of metal cutting.

This wide assortment affords you the advantage of being able to proceed from the equipment of a few machines for special jobs on up by easy stages to complete O. K. standardization, with its resultant economies in tool cost and upkeep and increased production speed. We shall be glad to go into detail on these O. K. advantages, by correspondence or through our representative.

THE O. K. TOOL CO., SHELTON, CONN.

THE TRADE OK MARK SYSTEM
OF INSERTED-BLADE METAL CUTTING TOOLS

PATENTS

(Continued from page 16.)

of plant, for which he solicits a patent; that he does not know and does not believe that the same was ever known or used before his invention or discovery thereof, and shall state of what country he is a citizen and where he resides, and whether he is a sole or joint inventor of the invention claimed in his application. In every original application the applicant must distinctly state under oath that to the best of his knowledge and belief the invention has not been in public use or on sale in the United States for more than two years prior to his application, or patented or described in any printed publication in any country before his invention or more than two years prior to his application, or patented in any foreign country on an application filed by himself or his legal representatives or assigns more than twelve months prior to his application in this country. If any application for patent has been filed in any foreign country by the applicant in this country, or by his legal repre-

(Continued on page 30.)

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GRIPS AS STRONG AS SOLID STEEL

CONCENTRIC WITHIN .001

FOR END MILLS

UNIVERSAL ENGINEERING CO. FRANKENMUTH, MICH.

HANDY ANDY'S WORKSHOP

(Continued from page 12.)

From one thing to another, a scientist has just produced an artificial female sex hormone. Yet the druggists tell us to avoid substitutes.

* * * * *

And not so long ago, a Detroit woman claimed to be the mother of a *synthetic* baby. Well, they've invented a lot of things in Detroit.

* * * * *

Which reminds me—what about the Fall Stag party?

* * * * *

—And that's all for now.

H.A.

NO PAUSE ON REVERSAL

The Rollway Reversing Models reverse automatically and cutting tools are not robbed momentarily of coolant. This is the only pump maintaining a vacuum sufficiently high to operate valves fast enough to avoid a pause in flow on reversing.

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Engineering Data Sheet embodies complete specifications of Reversing and Non-Reversing Models.

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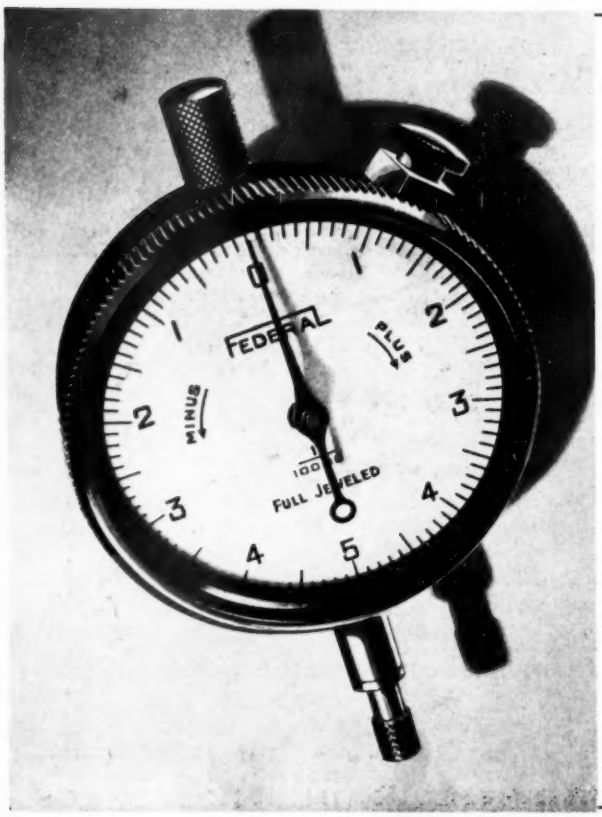

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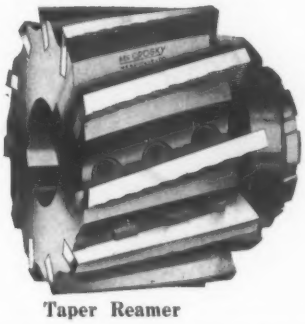
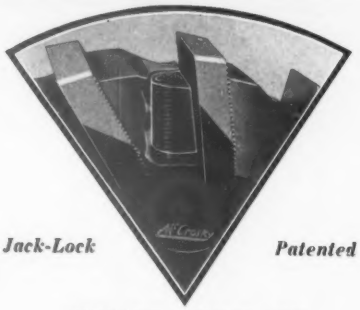
Special Serrated-Blade Tools with McCROSKY JACK-LOCK

Shell Core Drill



Taper Reamer

McCrosky's Jack-Lock Wedge and its screw are a self-contained unit occupying small space in the tool body and readily adaptable to special applications. Send McCrosky your work prints and machine specifications. We will submit a layout of a serrated-blade Jack-Lock tool specially designed for your job. For your reference file send for Bulletin No. 15-F showing Jack-Lock Tools designed for a wide variety of work.



Jack-Lock *Patented*

INSIDE VIEW OF JACK-LOCK WEDGE

Tightening the set-screw in the wedge lifts the wedge LIKE A JACK, forcing it over against the blade with a powerful compound wedging action. Retracting the screw releases the positive grip on the blade.

Blades can be quickly locked and unlocked without the usual hammering, reducing time-out for adjustment and preventing damage to body or blades by hammering.

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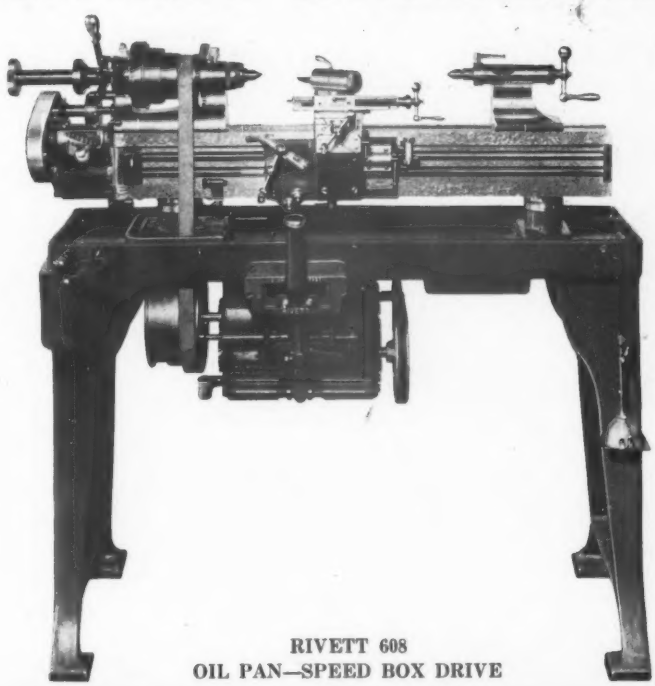
#608

Known throughout the world as "The Master Workman's Master Tool" in laboratories and development departments where highest possible precision standards are required. Its finely made attachments enable a skillful user to finish practically any operation without recourse to other machines. Offered with quick change gear box or change gears; oil pan, bench or cabinet mounting; speed box, horizontal safety drive or countershaft driving equipment. See Bulletin 608-B.



RIVETT 608
OIL PAN—SPEED BOX DRIVE

RIVETT LATHE & GRINDER, INC.

BRIGHTON
BOSTON, MASS., U.S.A.

PATENTS

(Continued from page 28.)

sentatives or assigns, prior to his application in this country, he shall state the country or countries in which such application has been filed, giving the date of such application, and shall also state that no application has been filed in any other country or countries than those mentioned, and if no application for patent has been filed in any foreign country, he shall so state. This oath must be subscribed to by the affiant.

If the application be made by an executor or administrator of a deceased person or the guardian, conservator, or representative of an insane person, the oath shall allege the relationship of the affiant to the inventor and, upon information and belief, the facts which the inventor is required by this rule to make oath to.

The Commissioner may require an additional oath in cases where the applications have not been filed in the Patent Office within a reasonable time after the execution of the original oath.

Office Actions. Applications are examined in their regular order of filing except under circumstances for which the Rules of Practice provide that a preference be given, or except upon verified showing which in the opinion of the Commissioner of Patents will justify special action.

The examiner, after a thorough search of the prior art, acts upon the merits and form of the application by letter to the applicant which is usually termed the "office action."

Office actions must state any requirements for division or election of species before any action on the merits of the invention will be taken. After such requirements are disposed of, any rejection of the applicant's claims on the merits of the invention is then stated with detailed reasons for such rejection including specific references to the prior art and a showing of how such art is applied to each claim so rejected. The office actions must also state any formal objections to the specification, drawings and claims, and any allowance of such claims as may properly define the invention over the prior art.

Division and Election of Species. Two or more independent inventions cannot be claimed in one application; therefore, if the applicant has inadvertently disclosed and claimed two or more independent inventions in his application, the examiner will require the applicant to divide the application by limiting its claims to only one invention. The applicant may then file a divisional application or applications for the other inventions during the pendency of the original application. Divisional applications must conform to rules applicable to original applications.

One or more species of an invention, not to exceed three in all, may be claimed in one application if that application contains an allowamle claim generic to all the claimed species. If, after a complete search of the prior art, the examiner finds that no generic claim presented is allowable, the applicant will be required to elect that species of his invention to which his claims shall be restricted if no generic claim is finally held allowable.

EDITOR'S NOTE: The next installment of this series on Patents will discuss the subjects of Amendment, Petitions to the Commissioner of Patents, Final Rejection and Appeal and other matters appertaining to the Patent Application.

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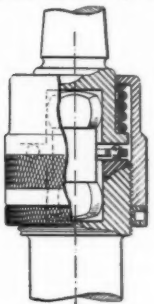

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(Continued from page 25.)

able to spend next summer in the Detroit area and attend at least one of your meetings.

In regard to starting a branch of the Society out here, I would need a little time to get the opinions and reaction of some of the men engaged in Tool-engineering work in this district.

While we have quite a variety of industries on the Pacific Coast; Tool-design work, as such, has been limited to a relatively small number of plants. Mass production such as you find it in the East is quite limited. Work of a Tool-engineering nature is more or less absorbed by the regular engineering force in those plants where the volume of such work does not warrant placing it under a special department of its own.

However, I shall try to contact as many men now engaged in this work as I can during the next two or three months and will then send you a report of my findings. You might send me a few application blanks and if you have them, some circulars stating the aims and objectives of the society.

Before closing I would like to ask if the Journal is not published in July as I did not receive my copy yet this month. Will you kindly have another copy sent to me if one was published this month.

Very truly yours,

Carl W. Horack.

Certainly, Prof. Horack, send in your critique. That is what we are looking for—criticism and comments by men experienced in the problems of Tool Engineering. We shall look forward to your letter.

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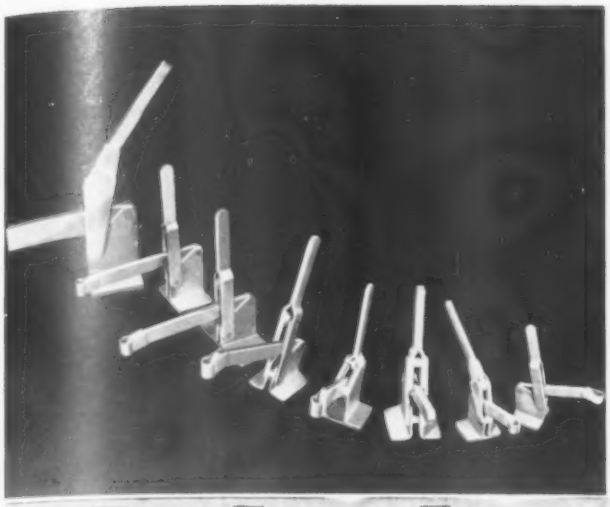

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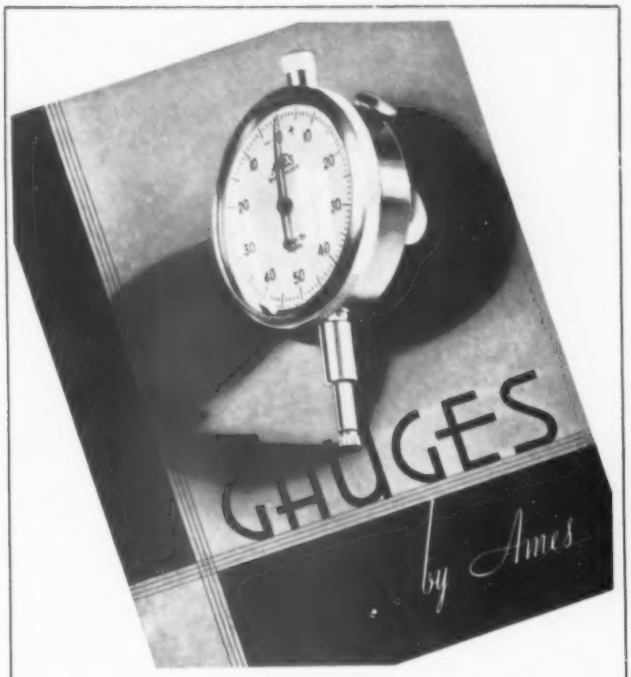

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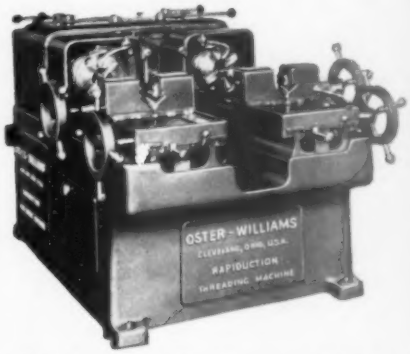

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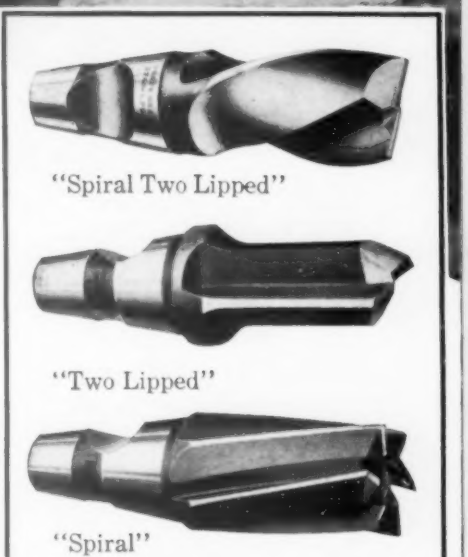

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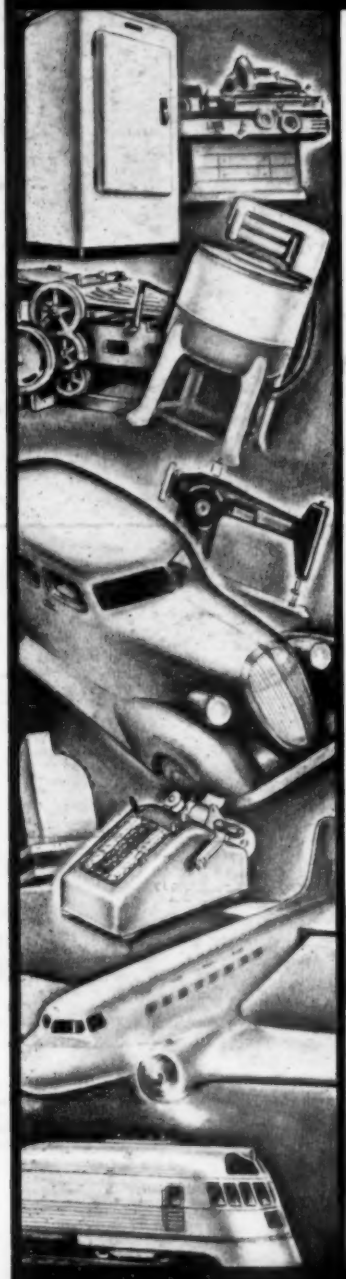

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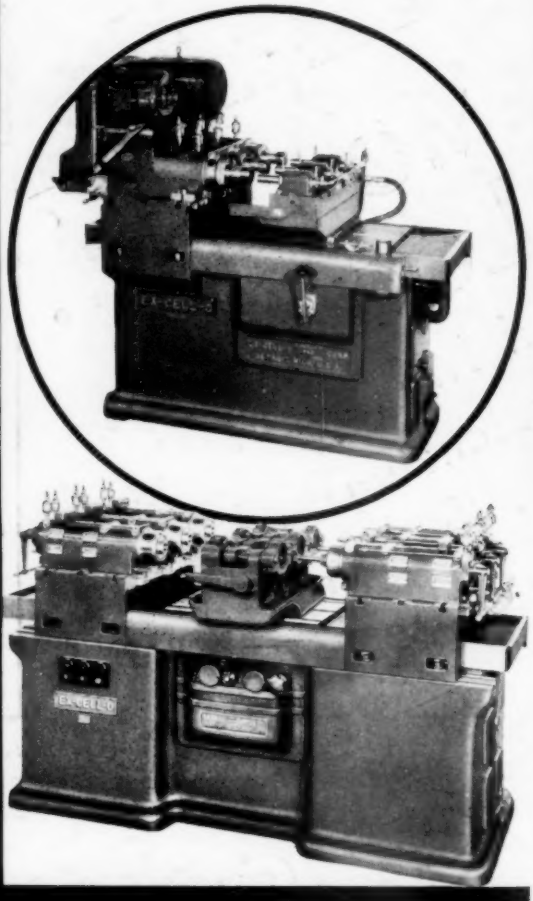

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